Environment, Health & Safety Division

August 31, 2000
DIR-00-150

Sherry M. Kelly
City Clerk
1900 Addison Street
Berkeley CA 94704

Subject: Berkeley City Council Information Request: Local Offsite Facilities of Lawrence Berkeley National Laboratory

Ms. Kelly:

Dr. Shank has asked me to reply to your letter of August 1, 2000 requesting information about Berkeley Lab activities, radioisotope usage, chemical usage, waste storage, and safety analysis documents for the Melvin Calvin Laboratory, the Donner Laboratory, and the Life Sciences Facility at the Dymo Building on Bolivar Drive.

Activities

Melvin Calvin Laboratory is the location for key scientific research by the Structural Biology Department of Berkeley Lab's Physical Biosciences Division. The aims of the research are to develop methods to understand the structure of biological molecules, and to identify and explain biomolecular structures (e.g. ribosomes and proteins). This information is used in research on molecular functions and disease states such as cancers and cystic fibrosis.

The Donner Laboratory houses major scientific research projects carried out by Berkeley Lab's Life Sciences Division, including research on cardiovascular disease and cholesterol, research in computational biology, and a national study of the relationship between exercise and incidence of cancer and heart disease.

Regarding the former Life Sciences facility at the Dymo Building on Bolivar Drive, Berkeley Lab currently has no facilities located there and no longer holds a lease for space there. We completed a formal closure survey prior to returning the facility to normal use in May 2000. A copy of the report of the closure survey was provided to the City earlier and is enclosed as Attachment A.

Radioisotope Usage

Individual laboratories at Calvin and Donner that use radioisotopes have a Radiological Work Authorization (RWA) issued by Berkeley Lab's Environment Health & Safety Division. Information listed in Attachment B shows that the RWAs issued for Calvin and Donner include radioisotopes of carbon, hydrogen, iodine, phosphorus, and sulfur.

From 1990 to 1994, the types and amounts of radioisotopes were typical of radiotracer usage at university or biotechnology laboratories conducting life sciences research. In 1995, in addition to radiotracer work, a single experiment used 2 curies of tritium (^{3}H)-labeled material in Calvin; this sealed sample was transported from and returned to the National Tritium Labelling Facility (NTLF) after the experiment in Calvin was completed. Since 1996, in addition to radiotracer work, quantities of tritium-labeled compounds (up to 25 curies) have been occasionally sent to Calvin for analysis using a high resolution nuclear magnetic resonance (NMR), unit located there. These tritium samples are sealed in ampoules (not unlike the glass tubes in self-luminous exit signs) prior to transfer from the NTLF and remain sealed the entire time they are at the Calvin lab. The sealed ampoules are returned to the NTLF following NMR analysis.

Chemical Usage

A variety of chemicals are used at Calvin and Donner in quantities typical of usage at university or biotechnology laboratories conducting life sciences research. Berkeley Lab's chemical usage is reported to the City by means of the annual submission of a Hazardous Materials Business Plan, as required by the federal Emergency Planning and Community Right-to-Know Act (EPCRA). A copy of the most recent submittal (dated March 28, 2000) is enclosed as Attachment C. EPCRA requires that the Business Plan list hazardous materials that exceed certain thresholds established by the State of California. For example, for 1999, Attachment C lists liquid nitrogen at Donner (Building 1), and liquid nitrogen plus acetone at Calvin (Building 3). Information for earlier years is available in the reports already filed with the City.

Waste Storage

Radioactive, hazardous and mixed wastes generated in the process of using radioisotopes and chemicals in research at Calvin and Donner are transferred to Berkeley Lab's Hazardous Waste Handling Facility (HWHF). Individual laboratories temporarily accumulate wastes locally, and that waste is transported to the HWHF for interim storage until it is sent offsite for treatment and disposal. There is no long-term storage of radioactive, hazardous, or mixed wastes at Calvin and Donner Laboratories.

Safety Analysis Documents

Safety Analysis Documents (SADs) are required to be developed for high-hazard facilities under Department of Energy (DOE) guidelines. SADs have also been prepared for some low-hazard facilities to confirm their low-hazard status, e.g. the SAD for the NTLF. Calvin and Donner Laboratories are very low-hazard facilities typical of university or biotechnology research laboratories; they do not require a SAD under DOE guidelines, and none has been prepared for them.

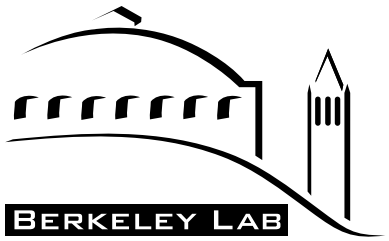
I thank you for your interest in Berkeley Lab's activities at Calvin and Donner Laboratories. If you have any further questions about the Laboratories, or about the information contained in this letter, please refer them to Gary H. Zeman, Radiation Control Manager, at 510-486-6626.

Sincerely yours,

David C. McGraw
Director, Environment, Health and Safety Division

Attachment A: Report of D&D of Building 934
Attachment B: Radioisotope Inventory Information for Calvin and Donner
Attachment C: Annual Submittal of the Hazardous Materials Business Plan dated March 28, 2000

Cc: R. Nolan
P . Lavely



Decontamination and Decommissioning of Building 934 at Ernest Orlando Lawrence Berkeley National Laboratory

Prepared by Mike Schoonover

Radiation Protection Group

Environment, Health and Safety Division

Ernest Orlando Lawrence Berkeley National Laboratory

May 2000

Prepared for the U.S. Department of Energy under Contract No. DE-AC03-76SF00098

Decontamination and Decommissioning of Building 934 at Ernest Orlando Lawrence Berkeley National Laboratory

Environment, Health and Safety Division

May 2000

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Mike Schoonover
Compliance Health Physicist
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Environment, Health and Safety Division

Reviewed by: _____ Date: 5/31/2000
Paul Blodgett
Group Leader, Industrial Hygiene
Environment, Health and Safety Division

Approved by: _____ Date: 5/31/00
Nancy Rothermich
Building 934 Decommissioning Project Manager
Environment, Health and Safety Division

Contents

Introduction

This document details the decontamination and decommissioning (D&D) process for Building 934 at the Ernest Orlando Lawrence Berkeley National Laboratory (LBNL). Lawrence Berkeley National Laboratory is a national laboratory owned by the United States Department of Energy (DOE) and operated jointly by the Regents of the University of California (UC) and DOE under contract number DE-AC03-76SF00098. Building 934 is a privately owned building leased by LBNL. It is located at 91 Bolivar Drive, Berkeley, California.

Building 934 is a one-story structure with approximately 70 rooms and a total of 33,000 square feet. There are approximately 25 laboratory rooms and 10 other work rooms, such as cold rooms used for work with chemicals and/or radioactive material. There are 19 fume hoods that were used for those materials. The building has been used by the LBNL Life Sciences Division since February 1979 to conduct biomedical research. Laboratory chemicals, low-level radioisotope biological tracers, and low-level biohazards have been used at the facility. Other LBNL uses of the building included a printing room, photo developing labs, and offices. A floor plan is attached.

The decommissioning process was undertaken prior to termination of the lease and return of the building to the owners to identify and address any radioactive material, chemicals, or biological materials that might have been present as a consequence of LBNL's activities at the facility. The facility, including all building surfaces and any ancillary equipment to be left behind, is required to meet DOE unrestricted release criteria, i.e., a level of radioactive material that is acceptable for use of the property without restrictions due to residual radioactive material. In addition, any residual chemical or biological materials due to LBNL's activities were removed so that use of the facility would be unrestricted. Equipment and building surfaces not meeting the release criteria were either decontaminated to specified levels or removed and transported to other authorized LBNL facilities.

The D&D was undertaken by LBNL's Environment, Health and Safety (EH&S) Division at the request of the Life Sciences Division. The D&D Project Manager is Nancy Rothermich, Group Leader of the Waste Management Group in EH&S. Other groups participating in the process were the Radiation Protection Group, the Industrial Hygiene Group, and the Environmental Protection Group of EH&S, LBNL Facilities Department, and contractors. See the D&D Team section for more details.

This document was prepared for the use of LBNL and the U.S. Department of Energy (DOE) for a limited purpose, as discussed herein. The information provided in the document is not, and should not be interpreted as, a warranty that Building 934 is free of defects or other conditions that could give rise to liability of any kind. For example, no information was gathered concerning the presence (if at all) of asbestos-containing building materials or lead-based paint.

Introduction (continued)

Neither LBNL nor DOE make any express or implied representation or warranty of any kind regarding Building 934, including its condition. Anyone wanting information about the condition or characteristics of Building 934 should consult the appropriate professional. Before undertaking any renovation or demolition work in Building 934, the building owner or person conducting the work may have a legal obligation to conduct an investigation of the type of construction materials present in Building 934; however, any such obligation is site-specific and is to be evaluated without advice or assistance from LBNL or DOE.

LBNL Use of Building 934

The primary use of the building by LBNL was for biomedical research conducted by the Life Sciences Division. Biological processes were studied via the use of plant and animal cells and cell components. The work performed was small in scale, using chemical or radioactive tracers to track biological processes. There was a print shop and small photo labs in the building. Some small-scale animal colonies (rodents) were used. Information on use of radioactive materials, chemicals, and biological materials by LBNL at Building 934 was gathered through a review of available records and interviews of persons with knowledge of operations at Building 934. Based on this review, the following radioactive materials, chemicals, and biological materials were used in the building by LBNL:

Radioactive Material

The radioactive isotopes reported to be used were as follows: phosphorus-32 (^{32}P), phosphorus-33 (^{33}P), sulfur-35 (^{35}S), hydrogen-3 (^{3}H), also known as tritium, carbon-14 (^{14}C), and iodine-125 (^{125}I). Of these radioisotopes, only ^{3}H and ^{14}C have half-lives greater than 90 days. Typical amounts of radioisotopes used per experiment ranged from less than 1 millicurie to 5 millicuries. Reportedly, annual use was a maximum of 100 millicuries of any radioisotope in any laboratory. Most of the work took place on laboratory benches. In some cases, where potentially volatile radioactive compounds (^{35}S and ^{125}I) were handled, fume hoods or vented biological safety cabinets were used. Radioisotope use was authorized via Radiological Work Authorizations (RWAs), issued by the LBNL Radiation Protection Group (RPG). LBNL uses RWAs to document radioisotope use procedures and limits of use, authorized personnel, and required precautions. All radioisotope work and storage areas were subject to routine surveillance by RPG. Reportedly, any spillage of any of these materials was cleaned up immediately.

Chemicals

Standard laboratory chemicals were used for life sciences research, including, but not limited to, miscellaneous organic solvents, flammables, alcohols, acids, alkalis, etc. The shops used standard printing inks and photographic chemicals. Reportedly, laboratory chemicals were handled by trained laboratory personnel and used in accordance with LBNL's PUB-3000 and Chemical Hygiene and Safety Plan, both of which incorporate engineering and administrative controls (i.e., use of chemical fume hoods, training, limiting chemical use, incorporation of spill response plans, etc.). The review found no indication that perchloric acid was used at Building 934. However, as a precautionary measure, fume hood exhaust fans were tested for perchlorates.

LBNL Use of Building 934 (continued)

Biological Material

Work with human cells reportedly was performed in accordance with policies and procedures dictated by the LBNL Biological Safety Program. Research involving Risk Group 1 and Risk Group 2 agents was conducted at the facility. All labs in the building were inspected and met the protection level for Biosafety Safety Level 2 organisms. The biological hazards were minimal, as the cells involved have been grown in culture for many years without evidencing any signs of infection by human pathogens.

Planning Process

D&D planning consisted of an initial evaluation, identification of potential residual materials based on history of use, development of D&D Plans for possible residual hazardous material, and assignment of a D&D team.

Identification of Potential Residues

The historical use of hazardous materials in the building was reviewed from reports of recent activities and records of possession. The LBNL Radiation Protection Group has records of the amounts and use descriptions of radioactive material and the records of any spills and/or releases. A chemical inventory identified chemicals used at the site and amounts on hand. Similarly, there were records of biological materials used. Present and former workers in the building were also interviewed to obtain additional information about materials and their uses.

Initial Evaluation

A team of specialists from LBNL's EH&S Division evaluated the history of use and conducted an initial walkthrough. A plan was developed, based on their observations and a review of the history of use of chemicals, radioactive material, and biological material. It was determined there might be chemical residues present on building surfaces, possible biological residue on some work surfaces, and possible radioactive contamination. Based on the history of facility use and interviews with workers, the presence of chemical, biological or radioactive residues on building exteriors, in ground water, or in soils was ruled out.

Planning Process (continued)

D&D Team

Project Manager: Nancy Rothermich, EH&S Waste Management Group

Radioactive Material Team Lead: Paul Whybark, EH&S Materials and Facility Disposition Group

Chemical and Biological Team Lead : Rob Connelly, EH&S Industrial Hygiene Group

Coordination of initial evaluation: Ginny Lackner, EH&S Environmental Protection Group

Other members of EH&S Division participating in the D&D Effort: Glenn Garabedian, Radiation Protection Group (radiation survey design); Mike Schoonover, Radiation Protection Group (data review, report preparation); Paul Blodgett, Industrial Hygiene Group (biological and chemical D&D planning).

Contractors:

Advanced Environmental Technology Services (decommission print shop)

Bartlett Nuclear Inc. (radiation survey technicians)

Ecology Control Industries (chemical decontamination of laboratories and fume hoods)

Technical Safety Services (biological decontamination of biological safety cabinets)

Training:

R. Connelly is a Certified Industrial Hygienist by the American Board of Industrial Hygiene (ABIH).

P. Whybark is fully qualified as an LBNL Radiological Control Technician, and is registered by the National Registry of Radiation Protection Technologists (NRRPT).

G. Lackner is a Registered Environmental Assessor in the State of California and a certified Hazardous Materials Manager (Academy of Certified Hazardous Material Managers).

Contractors supplied by Bartlett Nuclear are fully qualified as LBNL Radiological Control Technicians.

Decontamination and Decommissioning Plan

General

Survey and decontamination methods were determined based on the use of the building. All non-fixture items were surveyed using LBNL standards for release of equipment and removed to salvage, waste, or reuse at LBNL. Radioactive and hazardous waste was characterized, packaged, and disposed of through the normal LBNL waste disposal process. After all items and waste were removed from each room, a final survey was performed, using non-intrusive monitoring and sampling methods.

Rationale for Radioactive Materials Decommissioning

The applicable standard for release to the public of potentially radioactively contaminated property by LBNL is DOE Order 5400.5, *Radiation Protection of the Public and Environment*, with additional guidance provided by a memorandum issued 11/95 by DOE EH-412, "Application of DOE 5400.5 requirements for release and control of property containing residual radioactive material." These standards have been adopted through the DOE Work Smart Standards Process and are required by contract between DOE and the University of California. The standard lists residual contamination limits on surfaces and requires that ALARA (as low as reasonably achievable) techniques be applied to any release.

Additionally, other standards were reviewed, including MARSSIM (Multi-agency Radiation Survey and Site Investigation Manual), ANSI/HPS N13.12-1999, (Surface and Volume Radioactivity Standards for Clearance), 10 CFR20 Subpart E (Radiological Criteria for License Termination), and several NRC NUREG guidance documents pertaining to decommissioning. These standards were considered because they are used by external agencies that may have jurisdiction over the site once it is released. The decommissioning plan used some of the guidance from these other standards, consistent with the applicable DOE standards. Some of these other standards are dose-based, while the DOE standard is based on surface contamination levels.

The nature of the radioactive work and the level of routine surveillance that took place during operations led to the assumption that there is little probability of significant contamination on interior building surfaces (defined as a Class 3 facility in the MARSSIM system). The preliminary assessment ruled out the presence of radioactive contamination on building exteriors, in ground water, or in soils.

Rationale for Radioactive Materials Decommissioning (continued)

The only long-lived radioisotopes used at the facility were ^{3}H and ^{14}C, thus these are the expected contaminants. The DOE release levels for removable surface contamination for these radioisotopes, ^{3}H (10000 disintegrations per minute (dpm) per 100 square centimeters) and ^{14}C (1000 dpm per 100 square centimeters) are more restrictive than the comparable limits in the other standards (MARSSIM derived concentration guideline levels or ANSI screening levels).

The standard decommissioning methodology is to first scan surfaces with portable instruments to detect and decontaminate higher levels of contamination. Portable instruments are capable of detecting radioactivity if it exists at or above the detection limits of the instrument. Consequently, smear-testing, a technique that is capable of detecting radioactivity below the instrument detection limits, is used to assess areas where it is possible (based on use by LBNL) for lower levels of radioactivity to be present. Any contamination detected by direct instrument survey would exceed the release criteria, so smear testing and decontamination is performed in all such cases. The entire building will be scanned using portable instruments and all labs and work rooms will be smear tested.

Although routine surveillance during operations in Building 934 documented very little contamination, a very aggressive smear survey was built into the plan (much more thorough than would be required by the guidance above, based on the nature of the work).

For ALARA considerations, any radioisotope contamination detected by smears that was above a very low decision level near background was considered unacceptable for release. Smears were assayed by liquid scintillation counter by counting them for two minutes in standard counting solution. Background levels for the system used ranged from 10 to 20 counts per minute (cpm). The decision level for determining if a smear was positive was set at 50 cpm. A conservative project release level can be calculated using the decision level divided by the counting efficiency for the radioisotopes expected to be present, neglecting background. As shown in the table below, the project release level is less than 10 per cent of the DOE standard, and an even smaller fraction of the ANSI standard.

Comparison of project release level for smears (removable contamination) with standards

Units in dpm per 100 square centimeters

Radioisotope	Project release level	DOE Order 5400.5 release level	ANSI N 13.12 release level *
^{3}H	200	10,000	150,000
^{14}C	67	1000	150,000

* The reported ANSI values are for total average surface contamination. These values were reduced by a factor of 5, the ratio of removable contamination to average surface contamination in other standards.

Radioactive Material Decommissioning Plan

All equipment in the laboratories was surveyed and released per LBNL release standards. It was removed for reuse, salvage or waste. All other equipment in the building was also removed.

All laboratory rooms (whether used with radioactivity or not) in the building were then surveyed in detail. Floors, including adjacent hallways, walls, ceilings, sinks, benches, fixtures, drawers, cabinets, etc., were surveyed by instruments over all surfaces using "pancake" beta-gamma survey probes and sodium iodide gamma detectors. All other areas in the building, such as offices, were instrument-surveyed.

One 100-square-centimeter filter paper smear was taken in each square meter of work surface, storage surface (drawers, cabinets etc.), floor, walls, and ceiling in the laboratories. The smear coverage was higher inside fume hoods, where at least 10 smears were taken in each hood, including the inside edge of the exhaust duct baffles.

On the roof, the fume hood fan housing covers were removed and the fan housing was instrument-surveyed and smeared. The sink traps were removed in all labs and tested for radioactivity by instrument survey and water testing. Any contamination detected by instrument scan was removed and resurveyed via instrument and smear.

The criteria for release was no contamination distinguishable from background (see discussion in previous section). The minimum detectable contamination levels are shown in the next section.

All individual survey reports, follow-up actions, and rechecks were documented and reviewed.

Radioactive Material Instrumentation

1. Portable instruments used to scan surfaces:

Ludlum Model 3 and Model 16 survey meters with:

Ludlum Model 44-9 beta-gamma G-M pancake detectors

Ludlum Model 44-3 sodium iodide low-energy gamma scintillation detectors

Ludlum Model 44-2 sodium iodide gamma scintillation detectors

Instrument efficiency (@ near contact):

^{14}C : 5% (Model 44-9 detector) Minimum detection: 6000 dpm per 100 square cm.

^{32}P : 20% (Model 44-9 detector) Minimum detection:1100 dpm per 100 square cm.

^{125}I : 20% (Model 44-3 detector) Minimum detection: 2200 dpm per 100 square cm.

High-energy gamma emitters : average 3% (Model 44-2 detector)

2. Liquid scintillation counter (used to count smears):

Packard Model 2500 TR/AB Serial # 403951:

The counting protocol was set to separately detect ^{3}H, and higher-energy beta-gamma emitters. Swipes were counted by placing the 1.25-inch filters directly into plastic LSC vials and adding 10-milliliters of Ultima Gold cocktail. Count time was 2 minutes. The nominal efficiencies for this geometry are:

^{3}H : 25%

^{14}C and other high-energy betas : 75%

Instrument quality control

Daily counts of sealed unquenched ^{3}H and ^{14}C standards and an unquenched blank vial. From these counts, ^{3}H and ^{14}C spike count rates and blank count rates are plotted on control charts with control limits set to ± 3 standard deviations of the most

recent 100 values. The external quench monitoring system is also normalized at this time, minimizing small fluctuations in instrument response.

Chemical Decommissioning Plan:

All laboratory rooms and adjacent hallways were surveyed for chemicals or other hazardous materials. If any were identified, the hazardous materials were removed, and the removal was confirmed, all as follows:

- Vacuum cleaners equipped with high efficiency particulate air (HEPA) filters were used to remove loose, visible chemical residue, followed by using damp rags impregnated with a biodegradable, nontoxic cleaner.

- Visible chemical residue were removed from all horizontal and stained vertical surfaces including the floors, countertops, bench drawers, cabinet shelves, and interior surfaces of chemical fume hoods.

- All solid and liquid wastes generated by removal activities were packaged into DOT-approved containers and disposed of properly.

- Laboratory countertops, floors, fume hoods, and sink traps were surveyed for mercury residue. Sink traps in laboratory and nonlaboratory spaces were removed and surveyed for mercury. Equipment: Jerome Mercury Vapor Analyzers model # 411, s/n 411-2641, and 411-1008 (manufacturer-calibrated 11/15/99 and 12/2/99).

- Laboratory countertops, fume hood surfaces, floors, sinks, and shelving were pH tested following removal activities. Fume hood exhaust fans on the roof were also pH tested, as well as tested for perchlorates using a methylene blue test solution.

- Print shop: Stained portions of the carpet and flooring were removed and disposed. Chemical staining on these items was sampled for metals, volatiles and pH.

Biological Decommissioning Plan

Horizontal surfaces in all laboratories and adjacent hallways were decontaminated with a 10 percent bleach and water solution. Biological safety cabinets (BSCs) to remain in the building were decontaminated by using paraformaldehyde in accordance with National Sanitation Foundation (NSF) Standard 49.

Results Of Decommissioning Activities

Radioactive Materials

All processes in the D&D plan were successfully carried out, including characterization and removal of all radioactive waste. All rooms were surveyed. Over 7000 smears were taken and assayed for radioactivity. The only radioisotopes detected as contamination on surfaces were those that were expected, based on the preliminary assessment, ^{3}H and ^{14}C.

Contamination was detected by instrument surveys on 5 isolated surfaces, averaging less than 100 square centimeters each. The readings ranged from 1000 to 3000 cpm as detected by a Ludlum Model 44-9 G-M detector. The isotope was identified as probable ^{14}C in each case. All these areas were decontaminated and resurveyed by instrument and smears. Resurvey results were at background levels. These areas were in Room 41 (2 areas of floor), Room 35 (floor), Room 11 (benchtop), Room 11 (eyewash sink).

Smears from the following areas were assayed at levels above the decision level (distinguishable from background):
Room 11, Room 32, Room 34, Room 36, Room 43, Room 44, Room 45, Room 84.
These areas were decontaminated and resurveyed. No contamination above the decision level was detected upon resurvey. The contaminant in all cases was ^{3}H.

Chemicals

All processes in the D&D plan were successfully carried out. Any waste generated was removed and properly disposed.

pH tests of surfaces showed pH in neutral range.

Perchlorate tests were negative.

The samples of staining on the print shop carpet and subfloor were negative for metals and volatiles and had neutral pH..

Mercury was found in sink traps in Rooms 41 and 81. The mercury was removed or the trap was properly disposed of and replaced.

Biological Material

All processes in the D&D Plan were successfully carried out.

Records (on File with LBNL's EH&S Division)

- Detailed reports of decommissioning surveys:
  - meter surveys
  - smear assay results
  - chemical survey and sampling results
- Hazardous and radioactive waste disposal records
- Preliminary assessment
- Equipment release surveys
- Decommissioning planning and correspondence documentation
- Instrument calibration reports
- Training records
- Authorizations for radioactive material operations at Building 934
- Building 934 last chemical inventory
- Environmental monitoring results from routine operations at Building 934
- Reports of surveillance activities by EH&S associated with routine operations at Building 934
- Project photographs

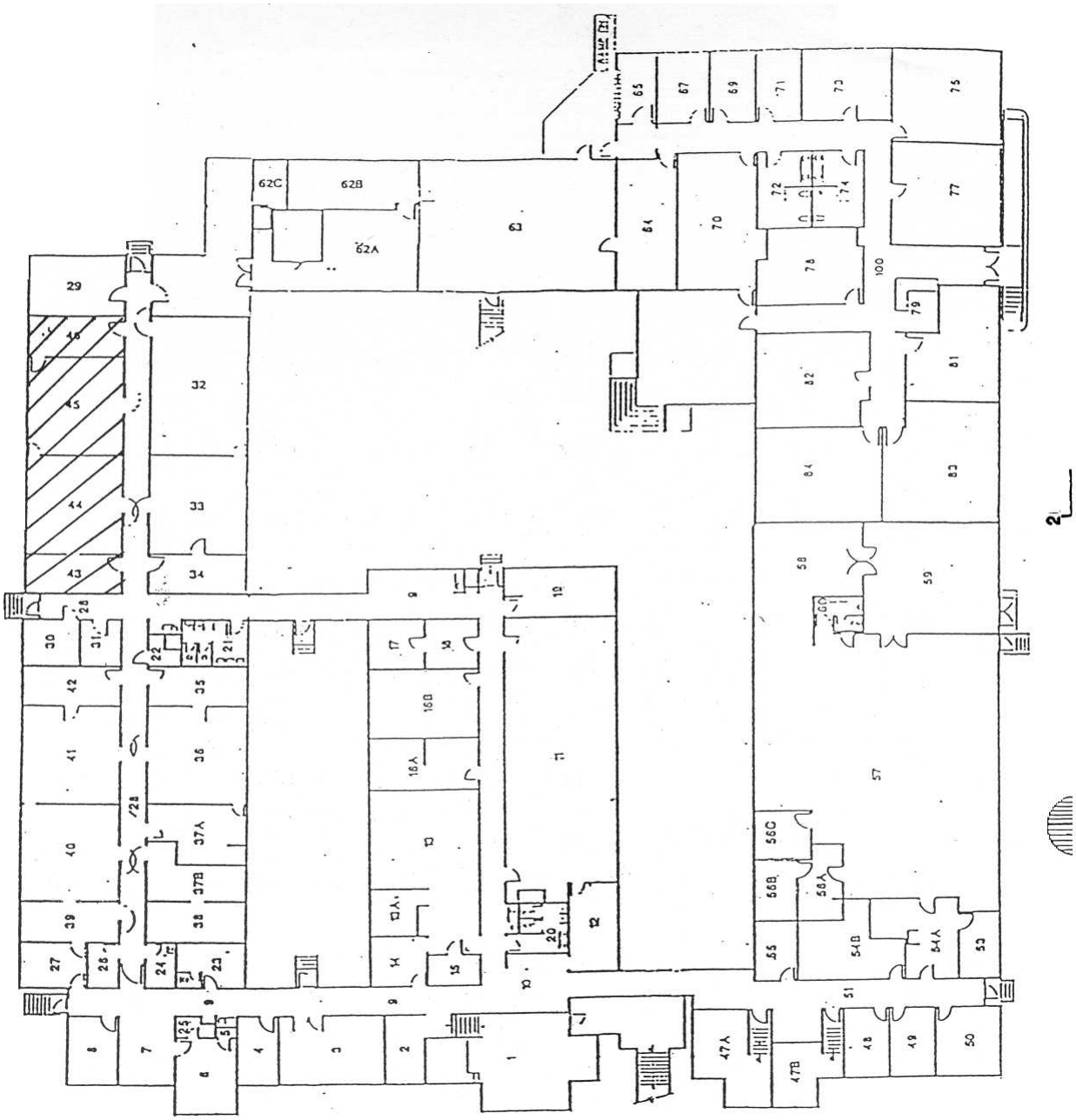
Conclusion

The decommissioning process for Building 934 addressed any radioactive material, chemicals and biological residues present at Building 934 as a consequence of LBNL's activities at that facility. The close-out is effective May 31, 2000.

The Decommissioning Plan was successfully carried out in all phases. The procedures and detection methods used were sensitive enough to meet Department of Energy and applicable external standards for release of property.

Attachment

- **Diagram of Building 934**



Bolivar Drive

Attachment B to D.C.McGraw letter dated August 31, 2000

Radioisotope Inventory Information* for Calvin and Donner

Date	Donner						Calvin				
	^{14}C	^{3}H	^{131}I	^{125}I	^{35}S	^{32}P	^{14}C	^{3}H	^{3}H **	^{35}S	^{32}P
Nov-90	0.015	0.04	-	0.01	0.01	0.01	0.005	0.1	-	0.01	0.035
Aug-91	0.015	0.05	-	0.01	0.01	0.01	0.015	0.2	-	0.01	0.035
Nov-92	0.015	0.05	-	0.01	0.01	0.01	0.015	0.2	-	0.01	0.035
Nov-93	0.015	0.05	-	-	0.01	0.01	0.015	0.2	-	0.01	0.035
Nov-94	0.015	0.05	-	-	0.003	0.01	0.015	0.2	-	0.01	0.035
Nov-95	0.06	0.2	-	-	0.003	0.002	0.005	0.01	2.0	0.01	0.035
Dec-96	0.06	0.05	-	-	0.002	0.002	0.005	0.01	10.0	0.01	0.01
Nov-97	0.06	0.05	0.004	0.005	0.002	0.002	0.005	0.01	10.0	0.01	0.01
Nov-98	0.06	0.05	-	0.006	0.002	0.004	0.005	0.01	25.0	0.01	0.01
Nov-99	0.06	0.05	-	0.006	0.002	0.002	0.005	0.01	25.0	0.005	0.01
Aug-00	0.06	0.05	-	0.004	0.002	0.002	0.005	0.01	25.0	0.005	0.01

* All quantities are in units of curies.

** Intermittent use with sealed systems (see text)

Data from 1990 to 1993 from shipment records and user information

Data from 1993 to present from authorization limits

March 28, 2000
DIR-00-087

City of Berkeley
Toxics Management Division
2118 Milvia Street
Berkeley, CA 94704

Attention: Mr. Nabil Al-Hadithy

Subject: E.O. Lawrence Berkeley National Laboratory Annual Submittal of the Hazardous Materials Business Plan

We are enclosing our annual submittal of Lawrence Berkeley National Laboratory's (Berkeley Lab's) "Hazardous Materials Business Plan." Please note the following with respect to the enclosed documents:

Berkeley Lab is a federal facility owned by the Department of Energy (DOE). In certain areas of environmental regulation, Congress has directed federal facilities to comply with state and local requirements and pay reasonable service charges. In the area of hazardous materials planning and reporting, however, while DOE facilities must comply with federal Emergency Planning and Community Right-to-Know Act (EPCRA) requirements pursuant to an Executive Order, no waiver of federal sovereign immunity from state and local regulation has occurred. Despite the lack of a sovereign immunity waiver, LBNL voluntarily complies with state requirements for hazardous materials planning and reporting. The attached report provides the information required by the state regulations.

(1) Hazardous materials are reported if they meet or exceed state thresholds, aggregated by building.

(2) Radioactive materials reporting is consistent with state requirements. State requirements provide for reporting of radioactive materials handled in quantities for which an emergency plan would be required to be adopted according to the Nuclear Regulatory Commission (NRC) or the State of California, Department of Heath Services (DHS) regulations. There are no radioactive materials at LBNL for which such an emergency plan would be required. All radioactive materials, including those in mixed waste, have been considered for this reporting category.

(3) Hazardous waste reporting is consistent also with state requirements. Waste quantities located at the Hazardous Waste Handling facility have been aggregated by buildings and quantities exceeding the state threshold are reported. Volumes of mixed waste have been considered for this reporting category due to their hazardous waste component.

(4). Appendix A and Appendix B are the only two forms required by the California Code of Regulations, Title 19. Additional information included in the submittal is presented voluntarily.

We trust that this information will assist your office in serving the needs of the community regarding hazardous material disclosure information.

Please feel free to contact Jack Salazar (486-6571) directly should you have any questions or wish to discuss this matter further.

Sincerely,

David C. McGraw
Director
Environment, Health and Safety Division

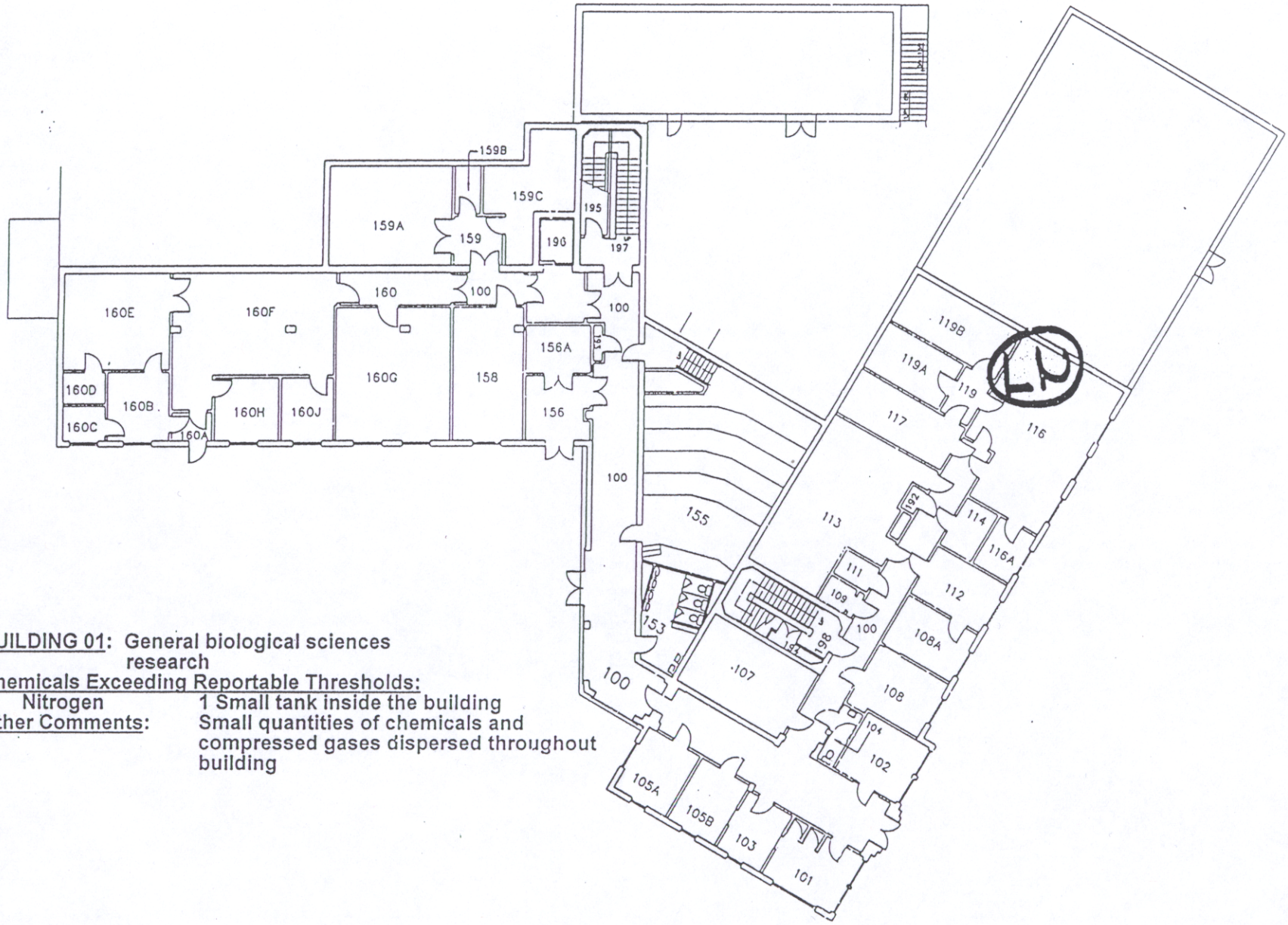
DCM/JJS/dss

Enclosures

cc: Ken Rivera, U.S. Department of Energy, Berkeley Site Office
Don Bell, Emergency Management
Ron Pauer, Environmental Protection Group
Nancy Rothermich, Waste Management Group

E.O. Lawrence Berkeley National Laboratory, March 22, 2000

9 Name Common	8 & 30 Chem Name (components)	10 CAS	11 Trade Secret	12 EHS	13 FC Class	14 pure mix	17 state	18 Fed Haz Cat	19 State Waste Code	20 days	21 Largest Cont	22 unit	23 Max Daily	24 Ave Daily	25 Ann Waste	26 cont	27 press	28 temp
BUILDING 1																		
NITROGEN, LIQUID	Nitrogen	7727-37-9	N	N	CRY	P	LIQ	P		365	42	GAL	465	465		AGT	2	3
BUILDING 2																		
HYDROGEN	Hydrogen	1333-74-0	N	N	FG	P	GAS	F		365	200	CFT	880	880		CYL	2	1
METHANE	Methane	74-82-8	N	N	FG	P	GAS	F		365	200	CFT	200	200		CYL	2	1
OXYGEN	Oxygen	7782-44-7	N	N	OX	P	GAS	F		365	220	CFT	1851	1851		CYL	2	1
DIESEL FUEL		000169-00-0	N	N	C	P	LIQ	F		365	4000	GAL	5000	5000		UGT	1	1
NITROGEN	Nitrogen	7727-37-9	N	N	CRY	P	LIQ	P		365	1500	GAL	1500	1500		AGT	2	3
BUILDING 3																		
ACETONE	Acetone	67-64-1	N	N	FL	P	LIQ	F		365	25	GAL	70	70		GB	1	1
NITROGEN	Nitrogen	7727-37-9	N	N	CRY	P	LIQ	P		365	600	GAL	600	600		AGT	2	3
BUILDING 4A																		
1153 BOILER TREATMENT	Sodium Hydroxide	1310-73-2	N	N	TOX	M	LIQ	C		365	55	GAL	55	55		PD	1	1
159 BOILER TREATMENT	Sodium Bisulfite	76-90-5	N	N	TOX	M	LIQ	C		365	55	GAL	55	55		PD	1	1
222-L INHIBITOR	Sodium Hydroxide	1310-73-2	N	N	TOX	M	LIQ	C		365	55	GAL	55	55		PD	1	1
	Sodium Molybdate	7631-95-0	N	N														
315 BIOCIDE	5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	N	N	TOX	M	LIQ	C		365	55	GAL	55	55		PD	1	1
NABAM	Disodium ethylenebixdithiocarbamate	142-59-6	N	N	TOX	M	LIQ	C		365	55	GAL	55	55		PD	1	1
	Ethylene thiourea	96-45-7	N	N														
	Sodium dimethyldithiocarbamate	126-04-1	N	N														
BUILDING 6																		
NITROGEN	Nitrogen	7727-37-9	N	N	CRY	P	LIQ	P		365	3600	GAL	3600	3600		AGT	2	3
BUILDING 10, 10A																		
ARGON/HYDROGEN (90/10)	Hydrogen	1333-74-1	N	N	FG	M	GAS	P		365	220	CFT	220	220		CYL	2	1
	Argon	7740-37-2	N	N														
DIESEL FUEL		000169-00-0	N	N	C	M	LIQ	F		365	55	GAL	55	55		AGT	1	1
BUILDING 16																		
ACETYLENE	Ethyne	74-86-2	N	N	FG	P	GAS	F		365	200	CFT	600	600		CYL	2	1
OXYGEN	Oxygen	7782-44-7	N	N	OX	P	GAS	F		365	200	CFT	400	400		CYL	2	1
NITROGEN	Nitrogen	7727-37-9	N	N	CRY	P	LIQ	P		365	3600	GAL	3600	3600		AGT	2	3
BUILDING 25, 25A																		
COPPER PLATER	Copper Sulfate	7758-98-7	N	N	COR	M	LIQ	C		365	130	GAL	130	130		SD	1	1
	Sulfuric Acid	7664-93-9	N	Y														
	Polyethlyne Glyol	25322-68-3	N	N														
FERRIC CHLORIDE ETCHER	Ferric Chloride	7705-08-0	N	N	COR	M	LIQ	C		365	165	GAL	165	165		SD	1	1
	Hydrochloric Acid	7647-01-0	N	N														
FINAL ETCH B	Hydrogen Peroxide	7722-84-1	N	N	COR	M	LIQ	C		365	55	GAL	330	330		PD	1	1



BUILDING 01: General biological sciences research

Chemicals Exceeding Reportable Thresholds:

Nitrogen	1 Small tank inside the building

Other Comments: Small quantities of chemicals and compressed gases dispersed throughout building

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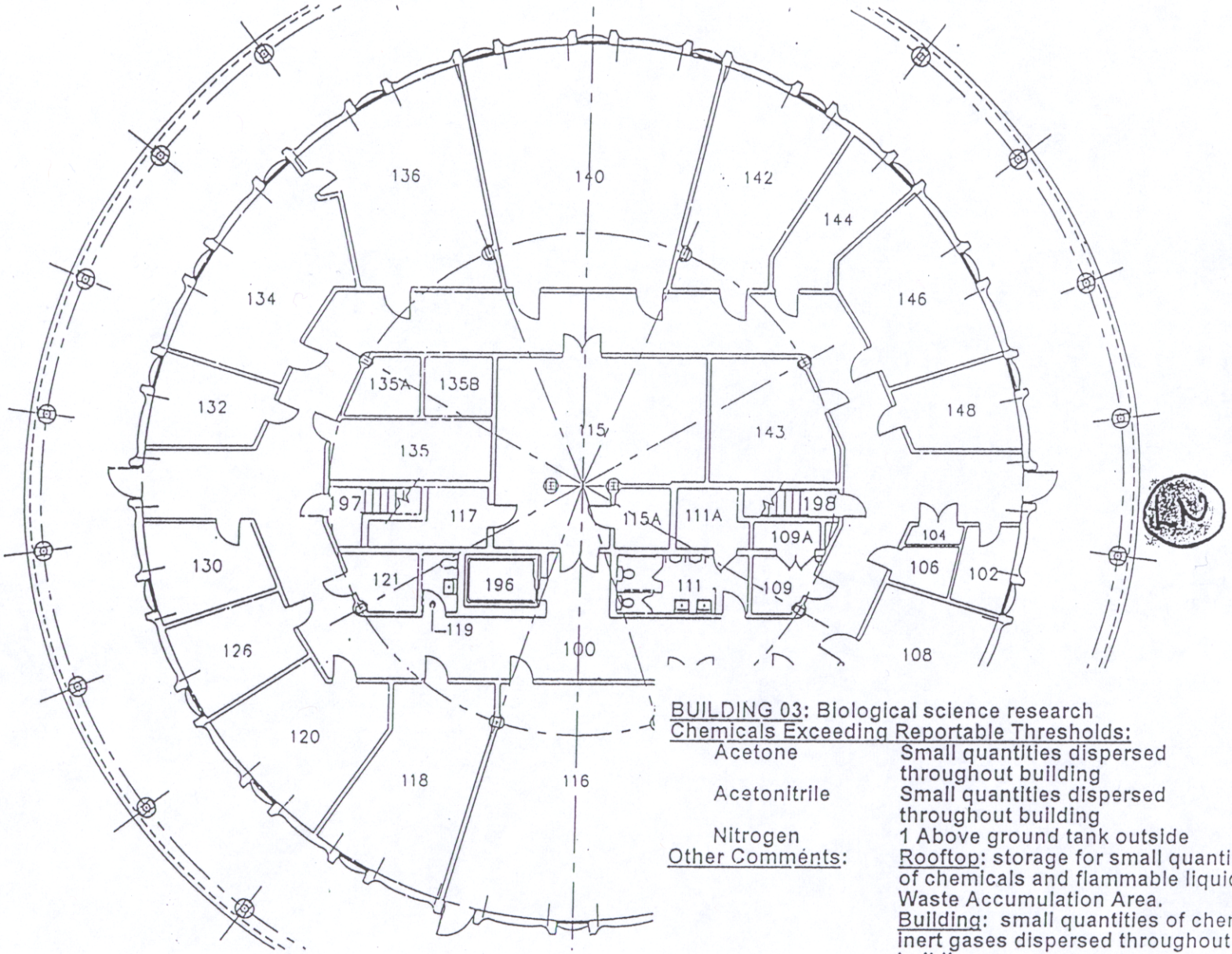

BUILDING 03: Biological science research

Chemicals Exceeding Reportable Thresholds:

Acetone	Small quantities dispersed throughout building
Acetonitrile	Small quantities dispersed throughout building
Nitrogen	1 Above ground tank outside

Other Comments: Rooftop: storage for small quantities of chemicals and flammable liquids & Waste Accumulation Area.
Building: small quantities of chemicals and inert gases dispersed throughout building.

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KEYPLAN

date: 4/14/98
update: WC

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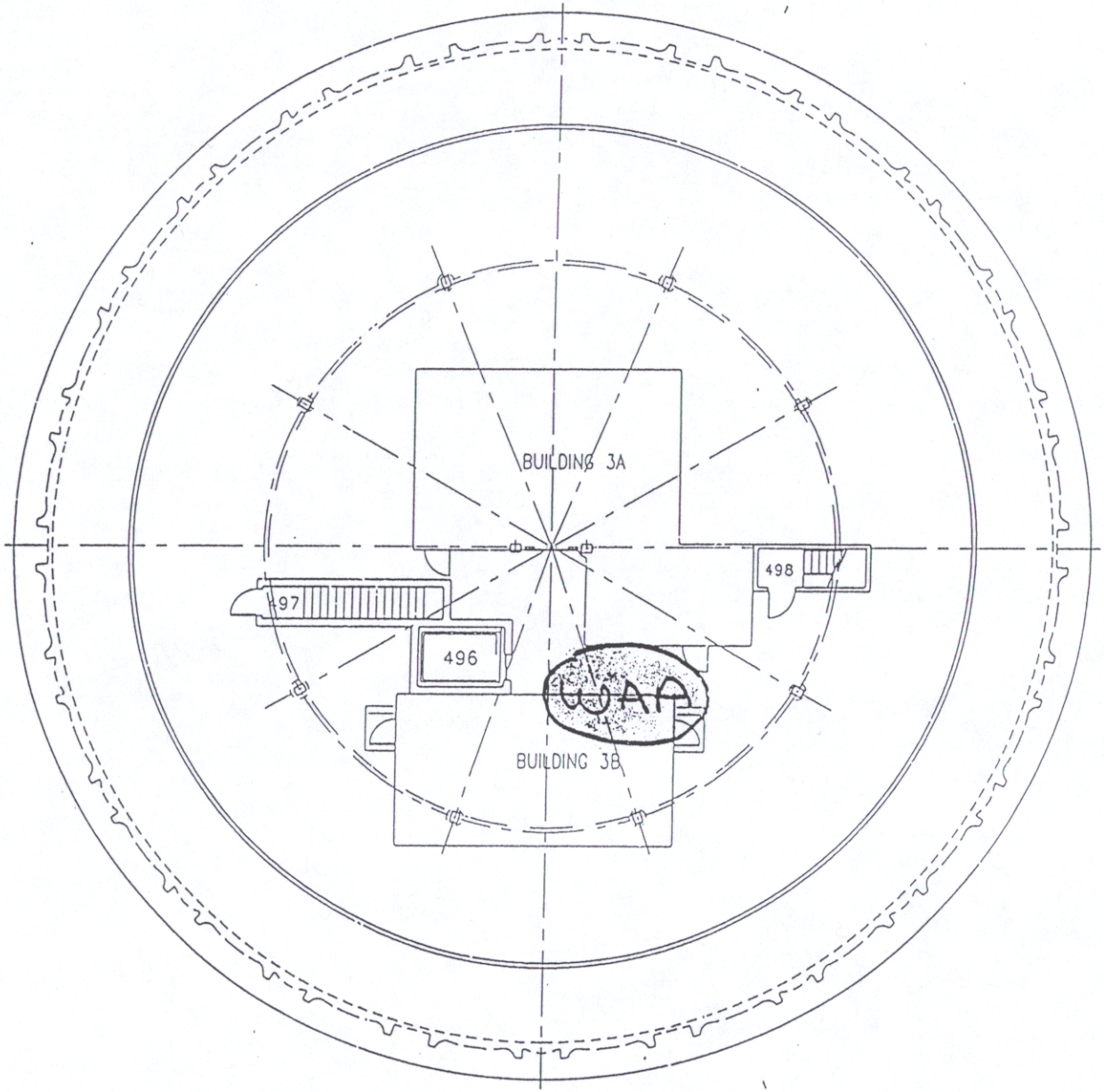

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FACILITIES DEPARTMENT

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ASBUILT CONDITION
KEYPLAN

date: 4/14/98
update: WC

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